Winter and February statistics for 2018

Description

Looking at the statistics you may be forgiven for thinking that the winter of 2017/18 was rather uneventful, as both temperatures and rainfall totals are quite close to average in most places.

In fact the statistic of interest when taking the season as a whole was sunshine, with this winter ranking as the 2nd sunniest for the UK (figures dating back to 1929), only fractionally behind 2015. Many areas had above average sunshine in each of the three individual months, Northern Scotland doing so by the widest margin.

Much of the winter was rather unsettled, and only in the second half of February did we get several generally dry days together. However, that was followed by winds from the east, temperatures dropping and the widespread snowfall last week.

Temperatures were slightly below average in Scotland in January, and over a degree below average for almost all of the UK in February, so, despite it being slightly milder than average in December everywhere and also in January for England and Wales, the season overall came in very slightly colder than average, though not as cold as winter 2013.

December and January were both slightly wetter than average for the UK as a whole, but February was rather drier, so overall the winter is close to average for many areas, with East Anglia rather wetter and eastern Scotland somewhat drier.

Provisional Winter 2018	Mean temp (°C)		Sunshine (hours)		Rainfall (mm)	
	Actual	Diff from avg (°C)	Actual	% of avg	Actual	% of avg
UK	3.6	-0.2	191.3	121	316.8	96
England	4.2	0.0	211.8	120	232.9	101
Wales	4.3	0.1	179.9	112	445.9	103
Scotland	2.3	-0.4	163.3	127	414.5	88
N Ireland	3.9	-0.5	173.7	117	352.2	112

February 2018

Much of the first half of February was rather colder than average, with only a few isolated milder days, but no exceptionally low temperatures anywhere (the lowest temperature up to mid-month being -11.0 °C at Bewcastle, Cumbria, on the morning of February 7th). It was rather unsettled, with the majority of places having at least half the month's average rainfall within the first half of the month, but with clearer slots in between the rain bands allowing ample sunshine. The second half of the month was rather quieter, and for a few days temperatures were closer to normal.

However, it gradually turned colder over the final week, also with increasing snowfall in some areas. The temperature fell to -11.7 °C at South Farnborough on the morning of the 28th, while some places had at least 15 cm snow depth as the month ended.

Provisional Feb 20118	Mean temp (°C)		Sunshine (hours)		Rainfall (mm)	
	Actual	Diff from avg (°C)	Actual	% of avg	Actual	% of avg
UK	2.4	-1.3	95.6	137	64.3	73
England	2.7	-1.4	99.4	134	44.7	74
Wales	2.7	-1.2	92.7	132	79.9	72
Scotland	1.7	-1.0	90.5	144	90.9	70
N Ireland	2.9	-1.4	91.6	137	74.0	88

Temperatures for the month were more than a degree below average in most areas. Cold Februaries have not been common in the last 20 years – with 2013 having been rather colder than average in south-eastern areas, and 2010 having been rather cold more widely and especially in the north.

This February was provisionally colder than 2013 but less cold than 2010. The years 1996, 1994 and 1991 saw rather cold Februaries, but it was 1986 that was very cold throughout which sticks in the memories of those of us of a certain age!!

It was a remarkably sunny February, provisionally ranking amongst the top 10 sunniest (figures dating back to 1929), in fact the UK as a whole had its second sunniest February, beaten only by 2008. Western areas generally fared best of all. Only the coast of Yorkshire had less than the full-month average.

You can find out the current forecast in your area using our forecast pages and by following us on Twitter and Facebook, as well as using our mobile app which is available for iPhone from the App store and for Android from the Google Play store.

Date Created
March 2018

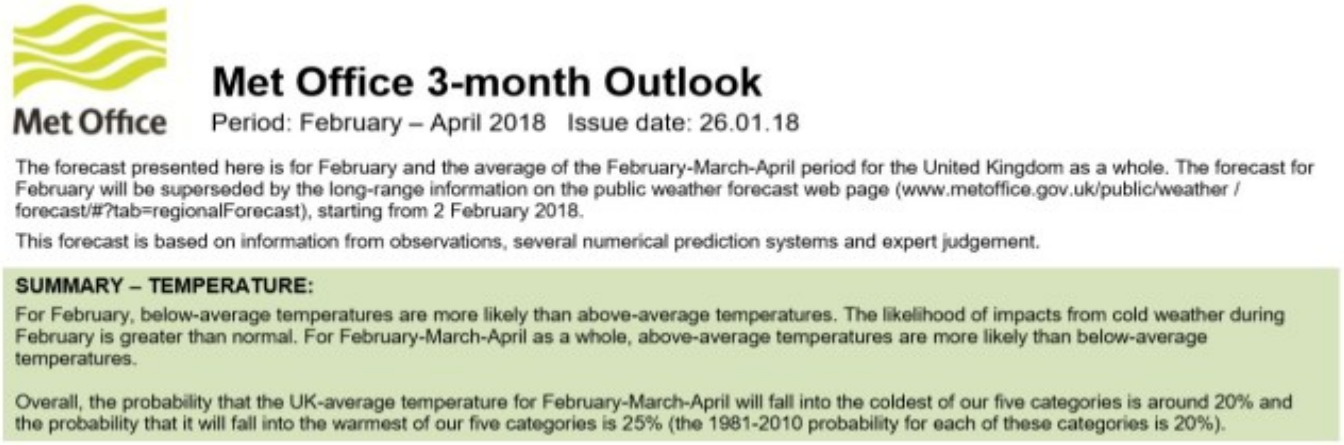
A review of our long-range outlook for the recent cold snap

Description

Various media reports have been commenting on our longer-range warnings in the run-up to the recent cold snap.

This period of severe weather was very well predicted and the first signs appeared around one month before the start, when we were able to offer broader advice about the likelihood of a cold signal. Our advice to government and the public ramped up in confidence and detail starting from the early signs in late January as events became clearer in our forecasts:

- 26 January: The first indications of a possible cold spell were given in our one-to-three month outlook for contingency planners. On 26 January we said:
  'For February, below-average temperatures are more likely than above-average temperatures. The likelihood of impacts from cold weather during February is greater than normal.'



Met Office

Met Office 3-month Outlook

Period: February – April 2018 Issue date: 26.01.18

The forecast presented here is for February and the average of the February-March-April period for the United Kingdom as a whole. The forecast for February will be superseded by the long-range information on the public weather forecast web page (www.metoffice.gov.uk/public/weather / forecast/#?tab=regionalForecast), starting from 2 February 2018.

This forecast is based on information from observations, several numerical prediction systems and expert judgement.

SUMMARY – TEMPERATURE:

For February, below-average temperatures are more likely than above-average temperatures. The likelihood of impacts from cold weather during February is greater than normal. For February-March-April as a whole, above-average temperatures are more likely than below-average temperatures.

Overall, the probability that the UK-average temperature for February-March-April will fall into the coldest of our five categories is around 20% and the probability that it will fall into the warmest of our five categories is 25% (the 1981-2010 probability for each of these categories is 20%).

  Note: that this public outlook is always updated a week later (2nd February), leaving only the three-month view. The one-month outlook reverts to the 30-day forecast at this time.
- 30 January: we briefed transport users and energy users with this information.
- 5 February: we emailed users of our long-range outlooks on the impending Sudden Stratospheric Warming event and increasing likelihood of wintry conditions.
- 6 February: reports of our warnings started to appear in the media.
- 9 February: we updated our online news release with a statement that there was now high confidence that a Sudden Stratospheric Warming was on the way.
- 10 February: a second article appeared in the Times in response to an enquiry. *Note: this article is only available to readers with a subscription.*
- 12 February: an online update was issued for the week ahead with a reminder of the Sudden Stratospheric Warming and the first yellow warnings of snow and ice.
- 16 February: a further online update explained that the Sudden Stratospheric Warming had happened highlighting the risk of cold easterlies and snow.
- Numerous media reports then highlighted the impending cold snap more widely.

- The first cold weather alert for England was issued in association with Public Health England on Wednesday 21 February, valid from Friday 23 February.
- We kept the public and key stakeholders with our online media updates on the 19th, 21st and 23rd February.
- The first National Severe Weather Warnings were issued on 23rd February.
- Thereafter, our shorter-range forecasts and updates gave clear warnings about the timing and location of the forecast snowfall, including: 25 February; 26 February; 27 February; 28 February; 1 March; 2 March: and 3 March.

So, in summary, the severe cold snap of late February and early March was very well predicted, even from long-range on this occasion. The Met Office provided clear and regular updates on the increasing levels of risk from late January onwards to ensure everyone was aware of how the weather would impact them and they could be prepared for it.

Date Created
March 2018

International Women’s Day

Description

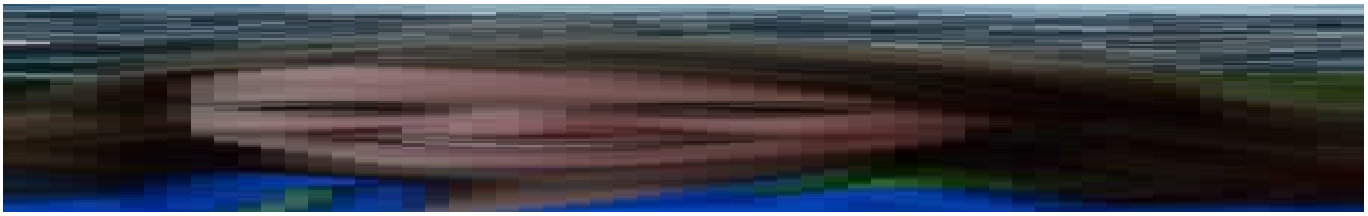
Stephen Belcher, Met Office Chief Scientist

We are joining organisations from around the world in marking International Women’s Day, an opportunity to celebrate the achievements of women and to support a call to action to accelerate gender parity.

As the Met Office Chief Scientist I recognise that there is often a gender gap across science, technology, engineering and mathematics (STEM) subjects and would like to take the opportunity today to celebrate the achievements of women working in these areas with a view to widening participation of women in STEM subjects and careers.

Science, technology, engineering and mathematics are at the heart of the Met Office and underpin our reputation for providing world-leading weather and climate science and services to government, businesses and the public. Our female scientists are world class in their fields, as reflected in their international leadership roles and by the awards they have won. On International Women’s Day I’d like to highlight a selection of their achievements and the contribution they make to weather and climate community, not just in the Met Office, but around the world.

***Rosa Barciela**, the Met Office’s first female Principal Consultant, has been working for many years on the impact of weather and climate on human health. In recent years she has been forging a closer scientific relationship with Public Health England and the Medical Research Council in the south west. Recently she has been made an Honorary Professor at the University of Exeter Medical School.*



***Claire Bartholomew** is a specialist in aviation meteorology. In 2017 she travelled to the USA to participate in the aviation weather testbed on behalf of the Met Office. We ran an experimental high-resolution (sub km scale) model for the testbed and Claire assessed how well this model performed in terms of improving real-time forecasts for visibility for San Francisco airport. Her work helped to demonstrate the value of this approach and we received exemplary feedback on her contribution to the testbed experiment.*

Nick Rayner *is a Met Office Science Fellow and leads a team of Met Office scientists looking at observations of the oceans and atmosphere. She was the winner of the 2017 L G Groves Award for Meteorological Observation for her work on HadISST, which is recognised as a world standard dataset for sea surface temperatures and sea ice concentration.*

Lizzie Kendon *is an international leader in the field of km-scale resolution (so called 'convection-permitting') regional modelling for climate and climate change. She recently led a high profile paper in the Bulletin of the American Meteorological Society (BAMS) on 'Do Convection-Permitting Regional Climate Models Improve Projections of Future Precipitation Change?' reviewing work in this frontier of climate modelling.*

Chiara Piccolo *has recently been appointed as the Strategic Head of Satellite Applications in Weather Science, leading a team of around 35 scientists and software engineers. Following postgraduate work in remote sensing at Oxford University, Chiara joined the Met Office to conduct research in data assimilation. Since that time, she has held two management roles, coordination of the EUMETSAT NWP Satellite Application Facility; and managing the Met Office Academic Partnership Programme, before taking on her current role.*

Fiona Carse

works in the Met Office's Marine Observations area and is co-manager of the UK Argo programme, representing the UK on the Argo Steering Team (which manages the global Argo Network). Argo floats measure profiles of temperature and salinity to a depth of 2,000 metres every 10 days for about 4-6 years and are deployed mostly in the Atlantic, Indian and Southern Oceans from UK and South African research vessels. Fiona has also been working in partnership with the Sea Mammal Research Unit and British Oceanographic Data Centre to obtain near-real time observations from seals foraging around the UK's coastal seas.

***Joanne Robbins** is a senior weather impact research scientist, working on high-impact weather, impact-based forecasting and landslides. She is an active member of the World Weather Research Programme Working Group on Societal and Economic Research Applications (SERA), which aims to advance the science of the social and economic application of weather related information and services.*

***Maureen Smith** is the Facility for Airborne Atmospheric Measurement (FAAM) Operations Manager, providing essential expertise and logistical support to enable the UK's atmospheric research aircraft to operate worldwide. Maureen was awarded the British Empire Medal in the 2018 New Year's Honours List for services to atmospheric science.*

***Jacqueline Sugier** is currently acting as the Strategic Head for Observations Research and Development. Her work revolves around defining and directing research activities in the field of network engineering, signal processing, and product development for the purpose of improving our real-time observation of potentially high impact atmospheric phenomena such as severe storms, lightning activity and volcanic ash clouds. These observations are used in real-time by our forecasters, the Civil Aviation Authority and the Flood Forecasting Centre.*

I've highlighted here only a small selection of our talented female scientists to give a flavour of the contributions of women to the Met Office Science Programme. I congratulate them on their achievements and thank them for their contributions.

Whilst I have focussed on our female scientists in this blog post, it would be remiss of me not to also acknowledge the fantastic achievements of women across a wide range of other professions and disciplines at the Met Office. Find out about some of these on our International Women's Day webpage.

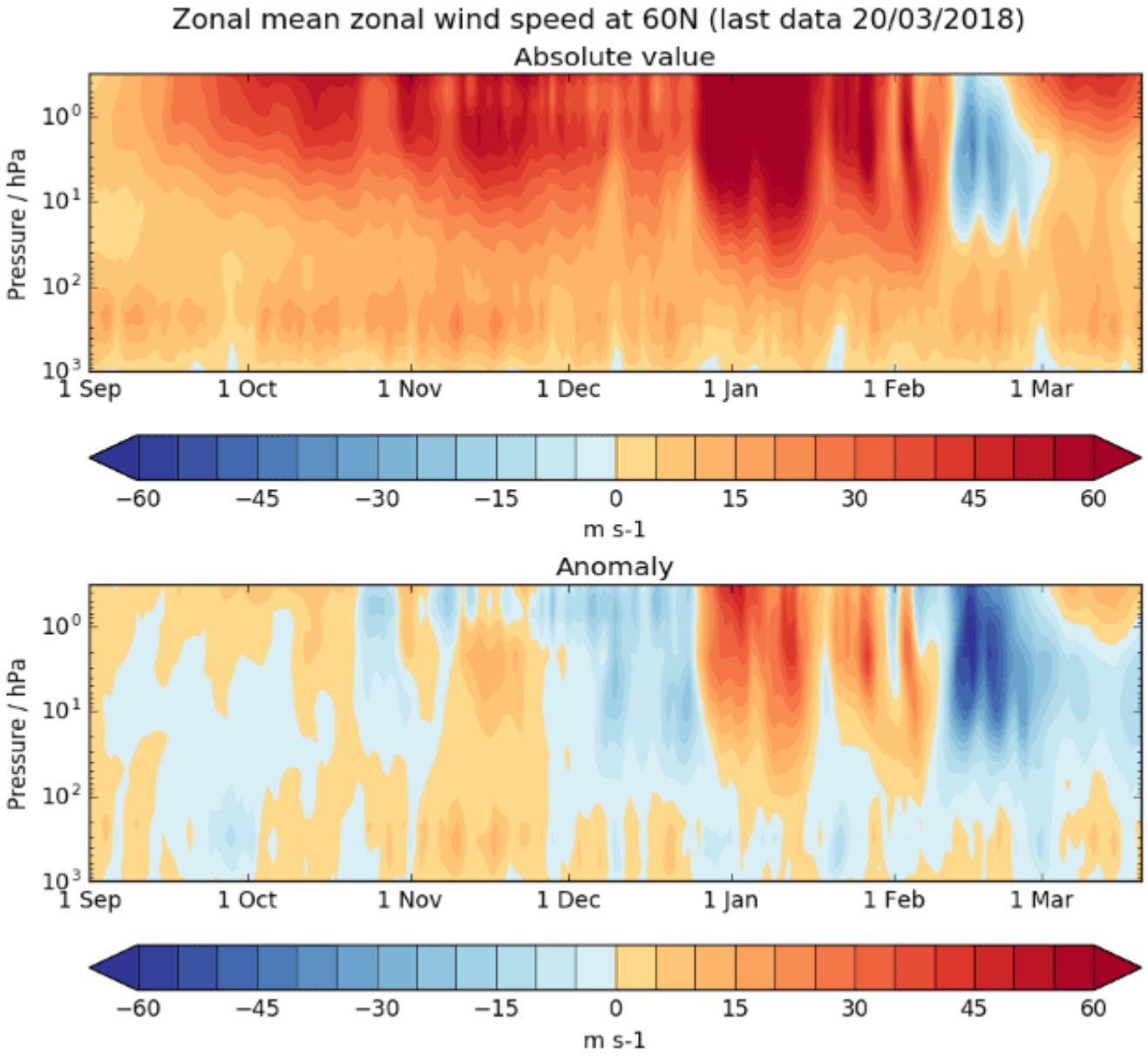
Date Created
March 2018

Will cold conditions return?

Description

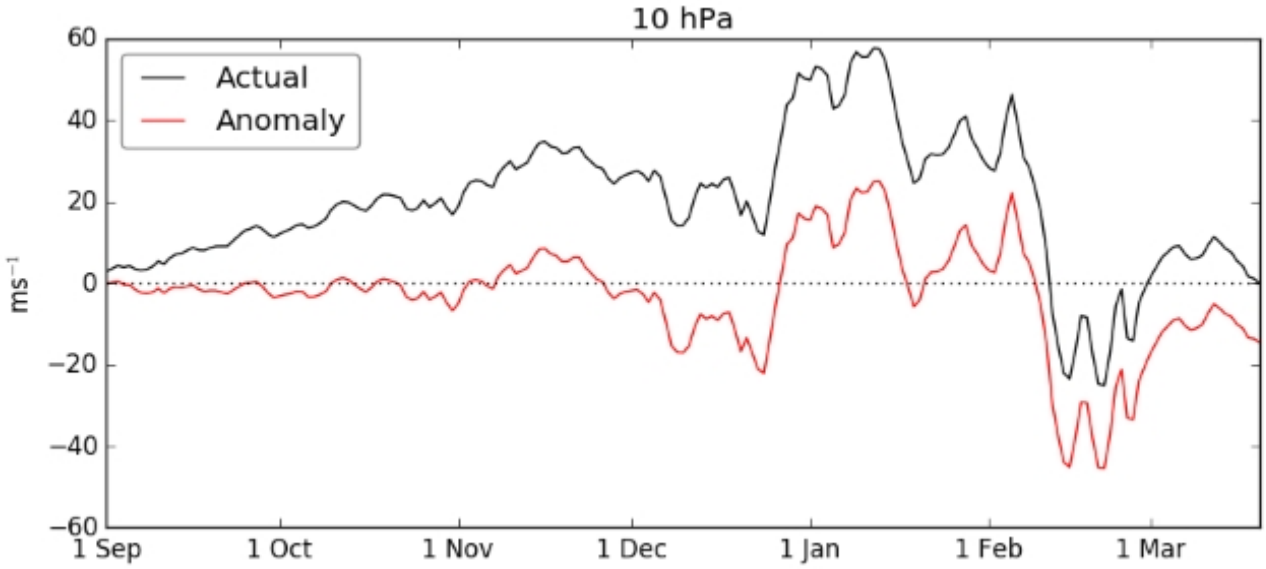
With two cold events already this month bringing freezing conditions and snow to the UK, some are beginning to question whether there may be further cold weather this Easter.

Met Office long-range forecasting expert Jeff Knight said: “It is too early to say exactly what weather



This graphic shows the greater than average occurence of westerly winds (warmer colours) during January, and the dramatic switch to greater than average easterly winds (cooler colours) from mid February.

The pattern of easterly winds leading to the repeated freezing conditions, was triggered from the tropics at the beginning of February and then exacerbated by a Sudden Stratospheric Warming on 12 February. This atmospheric disturbance propagated downwards weakening westerly winds all the way into the lower atmosphere. As we have reported previously this warming had a major impact by decreasing the westerly wind speed by more than 200 km per hour. This allowed the creation of high - pressure centres developing over Scandinavia and the Russian Arctic. With the clockwise flow around areas of high pressure, this brought some very cold spells with air tracking all the way from Siberia.



The black line in the above graph dips below zero in February – aligning with Sudden Stratospheric Warming. It also shows that it dipped into zero values yesterday at the extreme right.

Observations now confirm there has been a second, less intense SSW event. The lower stratosphere was already disturbed and this new event is unlikely to add much extra to what was already there.

Professor Adam Scaife, Head of Long-range Forecasting, explained: “The February stratospheric warming incident weakened the Polar Vortex – high-altitude westerlies – and the jet stream, giving rise to the intense easterlies at the end of February. Following a recovery in the first half of March, a second but less intense sudden stratospheric warming has just occurred consistent with the continuing risk of cold easterly winds.”

Date Created
March 2018

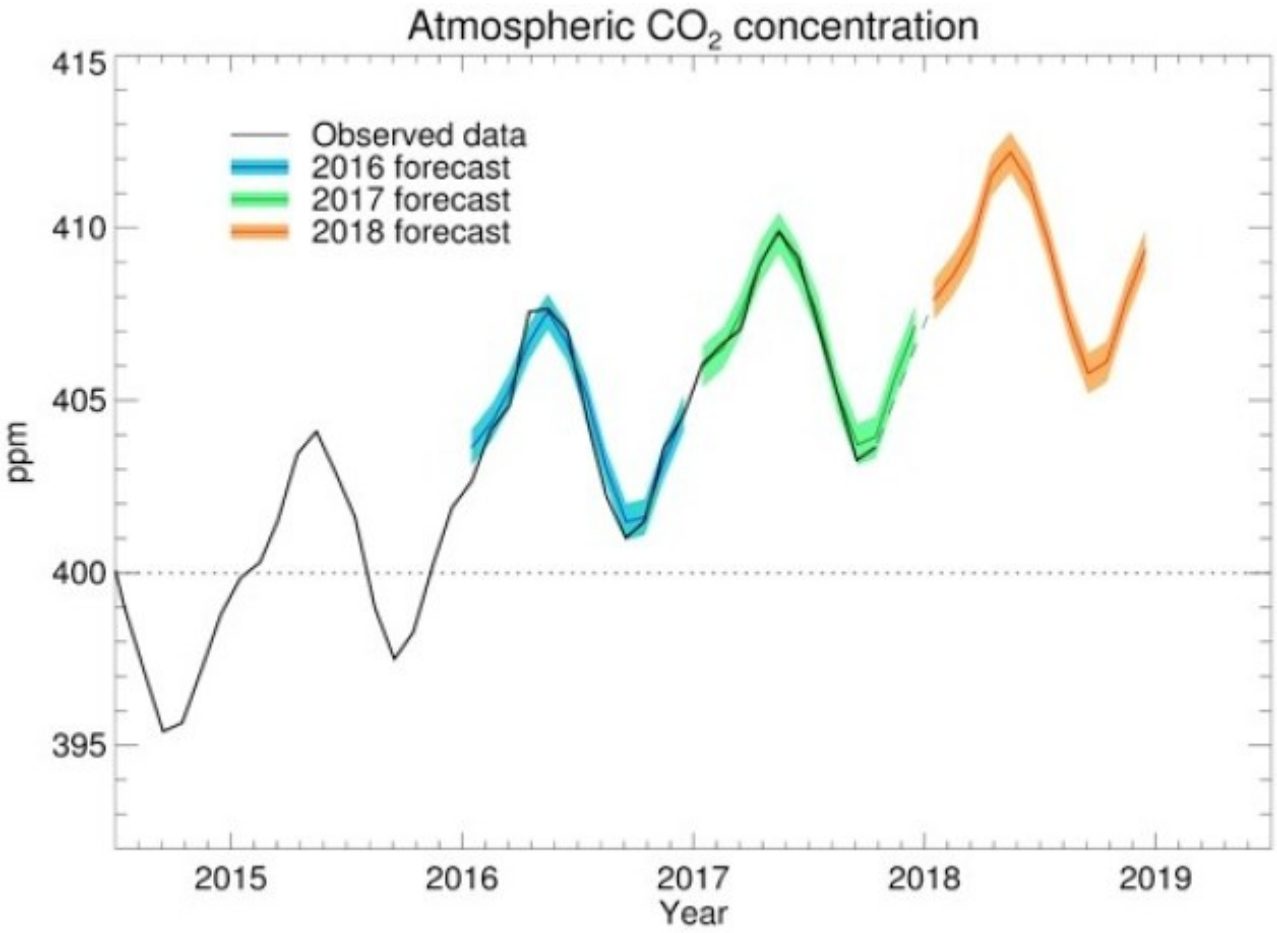
La Niña cools 2018 CO? forecast, but it will remain close to a record year

Description

The Met Office has released its annual forecast of the rise in atmospheric carbon dioxide concentration for the coming year.

Carbon dioxide will continue to rise as a direct consequence of emissions from fossil fuel burning and deforestation. But, in 2018 the rise is predicted to be smaller than in the last two years due to the temporary effects of climate variability on natural carbon sinks – locations which can absorb more carbon than they release.

The La Niña event has involved a temporary cooling of ocean temperatures in the eastern Pacific Ocean and shifts in weather patterns around the globe, especially in the tropics. Generally cooler, wetter conditions in many places cause enhanced vegetation growth, drawing down more carbon dioxide from the atmosphere than usual. While this is not enough to halt the rise in carbon dioxide concentrations resulting from human-caused emissions, it does slow the rise for a few months.



Forecast CO? concentrations at Mauna Loa over 2018 (orange), along with previous forecast concentrations for 2016 (blue) and 2017 (green) and Scripps

Institute measurements (black).

The Met Office forecast relates specifically to carbon dioxide concentrations measured at the Mauna Loa observatory in Hawaii. The forecast overlays Scripps Institute measurements. The average concentration at Mauna Loa in 2018 is forecast to be 2.29±0.59 parts per million (ppm) higher than in 2017. This increase is slightly less than that seen last year, and much less than the record rise of 3.39ppm seen in 2016, which was successfully predicted by the Met Office.

Professor Richard Betts, who compiles the annual Met Office carbon dioxide forecast, said: “Although the forecast carbon dioxide rise in 2018 would be smaller than the last two years, it would still be higher than the rise seen nearly every year of the 20th Century since records began in the 1950s, because emissions from human activities have increased.”

As a result of this rise, the annual average carbon dioxide concentration at Mauna Loa is forecast to be 408.9±06 ppm. As usual, the concentration will fluctuate over the year in response to carbon uptake by vegetation in the northern hemisphere summer growing season, followed by a release of carbon in the autumn.

The monthly average concentration is forecast to reach 412.2±0.6 ppm in May before dropping back down to 405.8 ± 0.6 ppm in September.

Table 1. Forecast monthly average CO? concentrations at Mauna Loa over 2018.

Month	Forecast CO? concentration (ppm)
January	407.9
February	408.7
March	409.6
April	411.5
May	412.2
June	411.3
July	409.5
August	407.4
September	405.8
October	406.1
November	408.0
December	409.4

Date Created
March 2018

Watch this space!

Description

Space weather is just the environmental conditions in space that can have an effect on Earth.

The most recognisable and visible of these is arguably the auroras (Northern and Southern Lights). However, as well as these spectacular natural phenomena, space weather also represents a real threat to our day-to-day life on earth; it can have an impact upon national infrastructure, technology, and communication systems.

Introducing more observations to improve forecasting

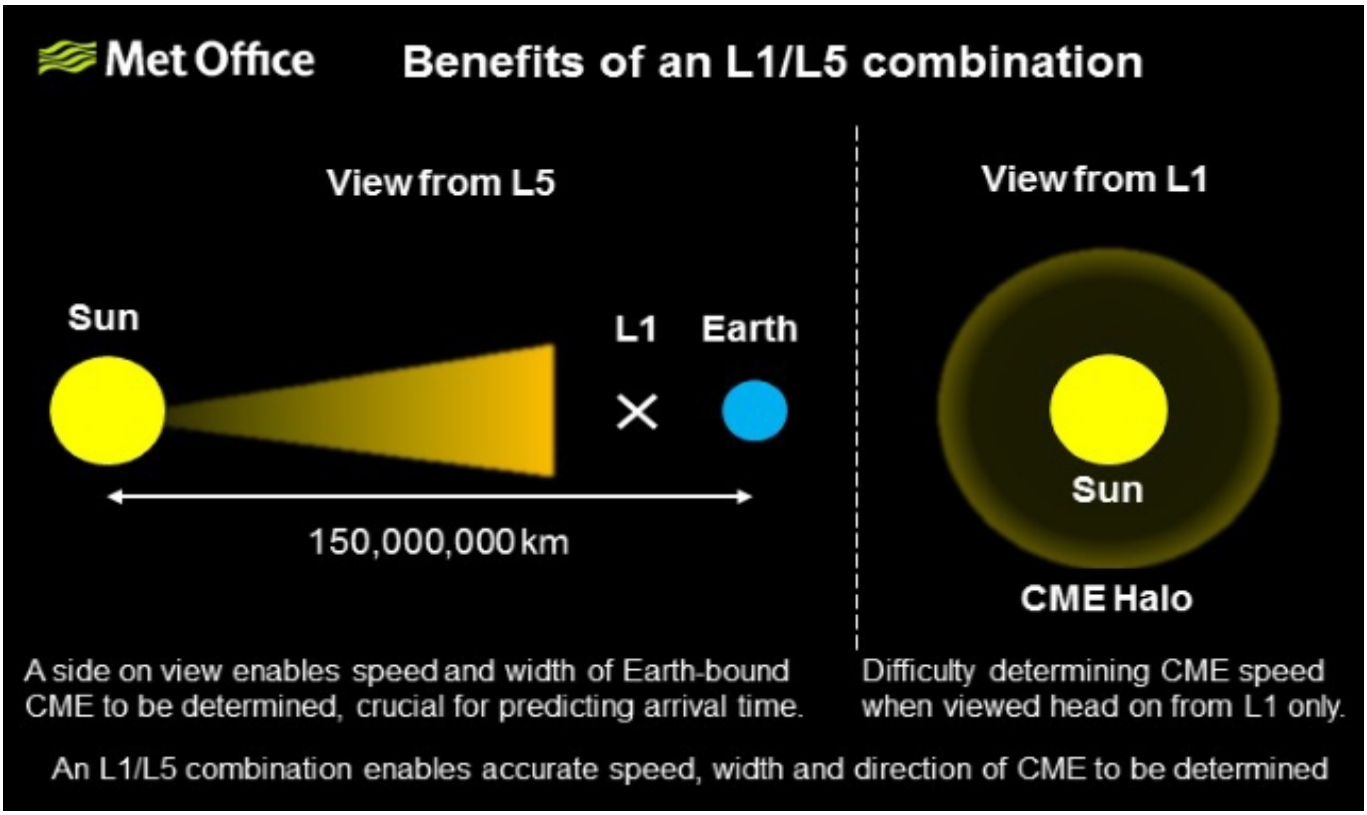
The Met Office ability to forecast space weather is dependent on the observations of the Sun that we receive from satellites in space. For terrestrial meteorology, we receive millions of observations, every hour, from ground-based equipment, satellites, aircraft and radiosondes. There are far fewer observations of the Sun’s activity.

A mission to launch a spacecraft to gather new observations of the sun is underway. The L5 mission, championed by the UK Space Agency, gives us an opportunity to improve space weather forecasting. The Met Office is one of the organisations in the UK involved in the project.

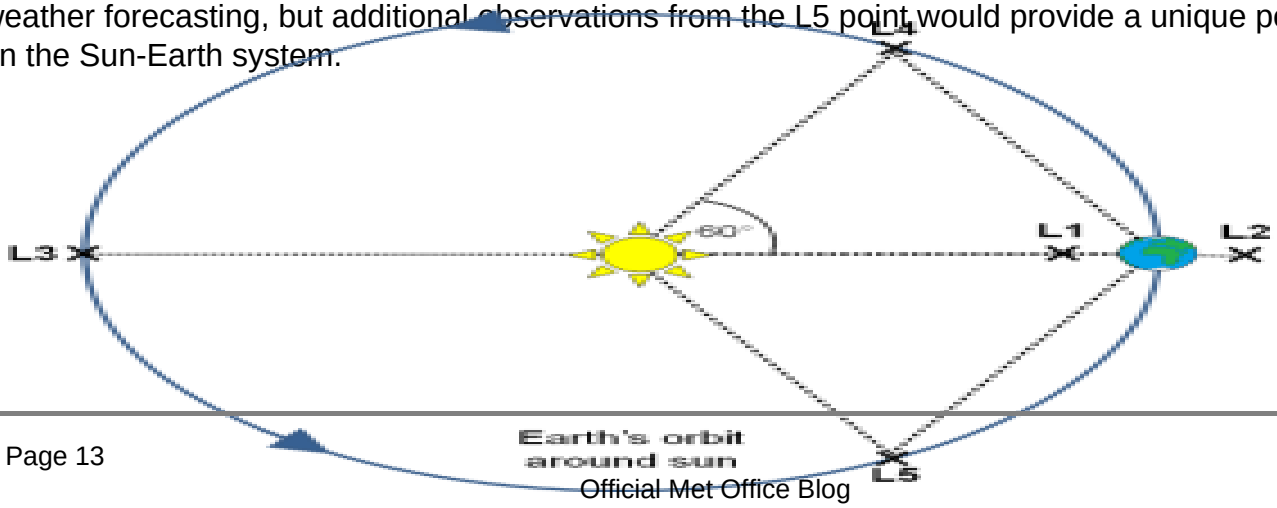
Having more observations will enable us to monitor the Sun for solar flares and coronal mass ejections (CMEs) more effectively. CMEs are large bursts of plasma from the surface of the sun and can reach the Earth in 18-96 hours, depending on speed and direction. They can result in geomagnetic storms that disrupt national power grids and global satellite and navigation networks.

Why do observations from L5 matter?

L5 refers to the 5th Lagrange point of the Sun-Earth gravitational system. A Lagrange point is a point in space where the gravitational pull of two objects cancel out (in this case the Sun and Earth), resulting in gravitational equilibrium. Any spacecraft positioned at a Lagrange point would experience a stable orbit and remain in the same place relative to the Earth and Sun.


Met Office
Benefits of an L1/L5 combination
View from L5
Sun
L1
Earth
150,000,000 km
A side on view enables speed and width of Earth-bound CME to be determined, crucial for predicting arrival time.
View from L1
Sun
CME Halo
Difficulty determining CME speed when viewed head on from L1 only.
An L1/L5 combination enables accurate speed, width and direction of CME to be determined

Currently the NOAA DSCOVR and NASA SOHO at the L1 point both provide observations for space weather forecasting, but additional observations from the L5 point would provide a unique perspective on the Sun-Earth system.



the potential impacts, knowing when a CME will reach Earth is crucial for reducing the impact on national infrastructure. Currently, with the satellite imagery available, determining the direction, speed and width of a CME accurately is challenging. L5 observations would enable much better calculation of these factors and greatly increase the precision of CME arrival forecasting.

The UK plays an important role

It's estimated a severe space weather event, could cost the UK as much as £4bn because of this it is on the Government's National Risk Register. The cost of an event could be significantly reduced by more accurate forecasting. To support this aim, in 2016, the UK Space Agency committed €22 million, over 4 years, to ESA's Space Situational Awareness (SSA) programme. This investment will support the UK's growing space sector, which is a core part of the government's Industrial Strategy, which aims to bring together the UK's world-class research base with business investment, ensuring we continue to develop the technologies and industries of the future.

Dr Graham Turnock, Chief Executive of the UK Space Agency, said:

"The UK is a world leader in providing space weather forecasts and this mission will help the Met Office's Space Weather Operations Centre improve this further. It's a great example of the value of our work as a member of ESA to science and industry in the UK."

Three out of four teams developing the platforms and instruments to support the European Space Agency (ESA) L5 mission are from the UK. Airbus UK will lead on developing the overall mission, with the focus on mission operations, the spacecraft platform, and on how this interfaces with the instruments. STFC RAL Space will lead the development of instruments to observe the sun and heliosphere and UCL Mullard Space Science Laboratory will lead the development of instruments to make measurements of the solar wind. OHB, from Germany, will lead the fourth consortium, aiming to develop a competing platform, with all proposals to be assessed by ESA. ESA is planning to select a final design for the spacecraft and its instruments based on the results of these studies, which are due in about 18 months.

Date Created
March 2018

Weather ready, Climate smart

Description

Weather-Ready, Climate-Smart' is the theme for World Meteorological Day being marked around the globe today.

As the UK's national meteorological service, we're at the forefront of weather and climate science, with wide-ranging capabilities and areas of cutting edge expertise used to support the World Meteorological Organization (WMO) and meteorological services around the globe.

Weather-ready

Ultimately, the Met Office is about keeping people safe. Our National Severe Weather Warning Service (NSWWS) is the flagship for both the public and those organisations that protect them, including national and local governments and the blue-light services. As well as helping individuals to decide whether they should travel or undertake an activity, we partner with emergency responders to plan ahead. It's this proactive approach working together with the UK's civil resilience community that helps protect life and property and ensure we are 'weather ready' during periods of severe weather like the recent heavy snow and cold temperatures.

From the first indications of a possible cold spell, highlighted to contingency planners at the end of January, to the NSWWS issued 5 days ahead of the first 'beast from the east', we issued over 300 briefings to the UK Government, Scottish Government and resilience groups around the country. The Met Office is operational 24/7, working around the clock helping both organisations and individuals prepare for extreme weather.

Climate-smart

The Met Office science programme performs world-class scientific research which is used to inspire, develop and deliver innovative weather and climate services. The science and advice we provide to Government, helps ensure policy and decision makers have up-to-date, robust evidence on which to base their decisions and is a key tool for building UK resilience in a changing climate.

Through our international work we help other countries develop climate services enabling them to build their own resilience, on both seasonal and long-term timescales. Increasingly, we assess and predict environmental risks, drawing together a thread that runs right through weather, climate and applied science, to deliver world-leading services. For example when assessing flooding risk, as we did in the National Flood Resilience Review (NFRR), we use model simulations to assess present-day risk, which then informs how that risk will change in future. This is all part of the ongoing challenge of translating weather and climate hazards into the impacts that matter for people, and is crucial to developing appropriate adaptation strategies.

Did you know?

Do you have any idea just how much work the Met Office does? We provide weather and climate-related services to the Armed Forces, other government departments, the public, civil aviation, shipping, industry, agriculture and commerce just to highlight a few areas.

Take a look at the infographic below, and download the interactive PDF to click on each tile to find out more.

World Met Day interactive PDF

Met Office | World Meteorological Day 2018
Did you know...
...the Met Office works with other organisations to reduce the risk of weather-related disasters?
...the Met Office radar network is critical for enabling accurate weather forecasts?
...Met Office national meteorological archives include records dating back as far as c1200?
...the Met Office works around the world to develop weather and climate services?
...Met Office collaborations are delivering ground-breaking science?
...the Met Office works with business to provide forecasts to help them deliver their services?
...the Met Office is part of a mission to launch a spacecraft to capture new observations of the Sun?
...the Met Office supports humanitarian response work across the globe?
...the Met Office provides forecasts to support the work of the emergency services?
Produced by the Met Office. Met Office and the Met Office logo are registered trademarks. © Crown copyright 2018, Met Office 00573

World Met Day

World Meteorological Day takes place every year on 23 March and commemorates the coming into force on 23 March 1950 of the Convention establishing the World Meteorological Organization (WMO). It showcases the essential contribution of National Meteorological and Hydrological Services to the safety and wellbeing of society and is celebrated with activities around the world.

Date Created
March 2018